Pending Claims

1. (Previously presented) A method for the continuous production of an extrusion solution for the formation of cellulosic molded bodies, such as fibers and films, according to the lyocell method, comprising:

(a) forming a cellulose suspension comprising cellulose pulp and an aqueous phase in a mass ratio in the range from 1:3 to 1:40 and shearing the cellulose suspension in a first shear zone for a period of time in the range from 5 to 200 minutes, wherein the cellulose suspension further comprises cellulose fine fibers and soluble impurities;

(b) dewatering the cellulose suspension to form a damp cellulose material with a cellulose content in the range from 20 to 80 mass-percent, wherein a portion of the aqueous phase from the dewatering is discarded and a portion is recycled for subsequent use in step (a), thereby removing at least a portion of soluble impurities from the aqueous phase while recycling at least a portion of the fine cellulose fibers,

(c) conveying the damp cellulose material through a second shear zone in the absence of N-methylmorpholine-N-oxide, wherein the damp cellulose material is homogenized in the second shear zone, and wherein the solubility of the damp cellulose material is increased;

(d) adding a sufficient amount of aqueous N-methylmorpholine-N-oxide to the homogenized damp cellulose material to form a cellulose suspension with a content of N-methylmorpholine-N-oxide in the liquid phase in a range from 70 to 80 mass-percent and conveying the homogenized suspension through a third shear zone

with the cellulose material essentially completely filling up the available conveyor cross-section in the shear zones; and

(e) converting the cellulose suspension in aqueous N-methylmorpholine-N-oxide into the extrusion solution by evaporating water evaporation with shearing in a fourth shear zone thereby reducing localized overheating and damage to the extrusion solution.

2. (Previously presented) The method according to Claim 1, wherein the portion of the recycled aqueous phase from step (b) is combined with fresh water for formation of the cellulose suspension in step (a).

3. (Previously presented) The method according to Claim 1, wherein the aqueous phase used in step (a) contains dissolved components.

4. (Previously presented) The method according to Claim 1, wherein the cellulose suspension is dewatered in step (b) with the aid of vacuum and/or pressure into a fleece and sensing of the water content of the fleece is determined with the aid of an infrared moisture measurer and is used to regulate the predetermined pressure parameter and/or the addition of the aqueous N-methylmorpholine-N-oxide in step (d).

5. (Previously presented) The method according to Claim 1, wherein the formation of the cellulose solution in step (e) is performed in a strong shear field with small heat exchange surfaces up to an NMMO/H_2O mol ratio in the range from 1:0.8 to 1:1.2.

6. (Previously presented) The method according to Claim 1, wherein the cellulose is enzymatically activated in step (a) by treating the cellulose suspension with 0.01 to 10 mass-percent enzyme, in relation to cellulose, at a temperature in the range between 20 and 70 °C and a pH value in the range from 3 to 10 for a duration in the range from 0.1 to 10 hours.

7. (Previously presented) The method according to Claim 6, wherein the enzymatic treatment is performed with 0.1 to 3.0 mass-percent enzyme at 30 to 60 °C and a pH value of 4.5 to 8 for a duration of 0.5 to 2 hours.

8. (Previously presented) The method according to Claim 1, wherein steps (a) and (b) are performed in the pulp factory.

9. (Previously presented) A device for the continuous production of an extrusion solution for the formation of cellulosic molded bodies, such as fibers and films, according to the lyocell method, comprising:

a mixing tank with suspending elements with means for shearing of contained solutions;
a pulp supply connecting piece for introducing pulp into the mixing tank;
an aqueous suspension agent supply connecting piece for introducing an aqueous suspension agent into the mixing tank;

a separating apparatus communicatively connected to the mixing tank wherein the separating apparatus is used for partial dewatering a formed aqueous pulp suspension;
a drain connecting piece communicatively connected to and between the mixing tank and the separating apparatus for removing a portion of the solution from the system;

a return line connected to the separating apparatus for returning any aqueous suspension agent separated from the separating apparatus to the aqueous supply connecting piece of the mixing tank;

a shearing apparatus including a first homogenization zone and adjoining suspending zone, having a first feed connecting piece for introducing pulp fleece from the separating apparatus at the beginning of the homogenization zone, a second feed connecting piece at the beginning of the suspending zone for introducing solvent, and a drain connecting piece for removing suspension at the end of the suspending zone, wherein the first homogenization zone and the adjoining suspending zone further comprise means for shearing the pulp fleece; and

a concentration and dissolving apparatus communicatively connected at a first end to the drain connecting piece of the shearing apparatus, a solution outlet connecting piece at the other end of the dissolving apparatus, and at least one vapor outlet connecting piece.

10. (Previously presented) The device according to Claim 9, wherein the separating apparatus is a vacuum screen belt press.

11. (Previously presented) The device according to Claim 9, wherein the separating apparatus is a vacuum screen drum filter.

12. (Previously presented) The method according to Claim 1 wherein the cellulose is enzymatically activated between steps (a) and (b), by treating the cellulose suspension with 0.01 to 10 mass-percent enzyme, in relation to cellulose, at a temperature in the range between 20 and 70 °C and a pH value in the range from 3 to 10 for a duration in the range from 0.1 to 10 hours.

13. (Previously presented) The method according to claim 6, wherein the enzyme is a cellulase.

14. (Previously presented) The method according to claim 12, wherein the enzyme is a cellulase.

15. (Previously presented) A method for the continuous production of an extrusion solution for the formation of cellulosic molded bodies, such as fibers and films, according to the lyocell method, wherein

(a) forming a cellulose suspension comprising pulp and an aqueous phase in a mass ratio in the range from 1:3 to 1:40 and shearing the cellulose suspension for a period of time in the range from 5 to 200 minutes;

(b) dewatering the cellulose suspension to form a fleece material with a cellulose content in the range from 20 to 80 mass-percent, wherein a portion of dewatered aqueous phase is reused for forming the cellulose suspension and a portion of the aqueous phase is discarded thereby removing at least a portion of impurities in the aqueous phase;

(c) shearing the fleece material in the absence of N-methylmorpholine-N-oxide, to form a homogenized cellulose material;

(d) adding a sufficient amount of aqueous N-methylmorpholine-N-oxide to the homogenized cellulose material to form a cellulose suspension with a content of N-methylmorpholine-N-oxide in the liquid phase in a range from 70 to 80 mass-percent and shearing the cellulose suspension in aqueous N-methylmorpholine-N-oxide to evaporate excess water and form the extrusion solution.